

PROPOSED NEW CLAIMS

21. An electrical machine, comprising:

- a) a stator;
- b) a rotor;
- c) a gap defined between the stator and the rotor;
- d) coolant supply duct means;
- e) coolant exhaust duct means;
- f) a plurality of substantially radially extending coolant passageways

provided in a laminated core section of at least one of the stator and the rotor, the coolant passageways being defined between axially spaced stacks of laminations in the laminated core section, the coolant passageways being connected to the coolant supply duct means through the gap between the stator and the rotor; and

g) a matrix of coolant duct sections extending circumferentially and axially of the laminated core section, a plurality of adjacent coolant duct sections being in fluid communication with each other in a direction transverse of a radial direction to transfer coolant in predetermined paths within the matrix, the matrix having first and second radially spaced apart faces, the first face being in fluid communication with the radially extending coolant passageways in the laminated core section, the second face being in fluid communication with the coolant exhaust duct means, selected coolant duct sections communicating directly with the coolant exhaust duct means through the second face of the matrix.

22. The electrical machine according to claim 21, in which the first and second radially spaced apart faces of the matrix comprise radially inner and outer faces, respectively, of the matrix.
23. The electrical machine according to claim 21, in which the matrix is defined between a plurality of annular side walls which extend radially and circumferentially of the laminated core section and a plurality of end walls which extend radially and axially of the laminated core section.
24. The electrical machine according to claim 23, in which apertures are provided in selected side walls and end walls of the coolant duct sections to facilitate the transfer of coolant in the predetermined paths within the matrix.
25. The electrical machine according to claim 24, in which a size and a number of the apertures are selected to achieve desired axial and circumferential pressure differences within the matrix.
26. The electrical machine according to claim 24, in which each side wall and each end wall has a respective aperture.
27. The electrical machine according to claim 23, in which a side wall at each axial end of the matrix constitutes an end plate of the laminated core section.
28. The electrical machine according to claim 23, in which the end walls are equi-angularly spaced around the laminated core section.
29. The electrical machine according to claim 21, in which each coolant duct section communicates directly with the plurality of the radially extending coolant passageways through the first face of the matrix.

30. The electrical machine according to claim 21, in which the coolant supply duct means defines a coolant supply path directed towards an axial end of the laminated core section through a plenum chamber axially adjacent the laminated core section, and in which the gap between the rotor and the stator communicates with the plenum chamber to provide a coolant flow path from the plenum chamber to the radially extending coolant passageways in the laminated core section.

31. The electrical machine according to claim 30, in which the coolant supply duct means defines coolant supply paths directed towards both axial ends of the laminated core section through respective plenum chambers.

32. The electrical machine according to claim 31, in which end plates for the laminated core section are provided at axial ends of the matrix, and in which apertures in at least one of the end plates of the laminated core section provide a coolant flow path from the respective plenum chamber to selected coolant duct sections in the matrix.

33. The electrical machine according to claim 21, in which at least one of the coolant supply duct means and the coolant exhaust duct means extends radially of the machine.

34. The electrical machine according to claim 21, in which the plurality of substantially radially extending coolant passageways provided in the laminated core section comprises axially thin annular ducts.

35. The electrical machine according to claim 34, in which the axially thin annular ducts are defined by spacer means provided between adjacent confronting stacks of the laminations in the laminated core section.

36. The electrical machine according to claim 35, in which the spacer means comprise a pattern of mutually spaced apart, axially projecting, generally cylindrical members

attached to at least one of the confronting laminations, the pattern extending between radially inner and outer peripheries of the confronting laminations.

37. The electrical machine according to claim 36, in which the pattern of generally cylindrical members extends throughout a total annular extent of the passageways.

38. The electrical machine according to claim 21, in which the matrix extends around an entire circumference of the laminated core section.

39. The electrical machine according to claim 21, in which the coolant duct sections which communicate directly with the coolant exhaust duct means comprise approximately half a circumferential extent of the matrix.

40. The electrical machine according to claim 21; and further comprising a propulsion unit for a ship in which the machine is located within a bulbous portion extending from a hull of the ship, the rotor of the machine being located on a propeller shaft which extends outside the bulbous portion for propulsion of the ship, the coolant supply duct means and the coolant exhaust duct means being arranged within the bulbous portion to supply and exhaust coolant through the ship's hull.